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L29: Entry 1 of 4 File: USPT Oct 26, 1999

US-PAT-NO: 5971091
DOCUMENT-IDENTIFIER: US 5971091 A
**** See image for Certificate of Correction ****

TITLE: Transportation vehicles and methods

DATE-ISSUED: October 26, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Kamen; Dean L.	Bedford	NH		
Ambrogi; Robert R.	Manchester	NH		
Duggan; Robert J.	Northwood	NH		
Heinzmann; Richard Kurt	Francestown	NH		
Key; Brian R.	Pelham	NH		
Skoskiewicz; Andrzej	Manchester	NH		
Kristal; Phyllis K.	Sunapee	NH		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
DEKA Products Limited Partnership	Manchester	NH			02

APPL-NO: 08/ 384705 [PALM]
DATE FILED: February 3, 1995

PARENT-CASE:
This application is a continuation in part of U.S. application Ser. No. 08/250,693, filed May 27, 1994, now U.S. Pat. No. 5,701,965 which in turn is a continuation in part of U.S. application Ser. No. 08/021,789, filed Feb. 24, 1993 now abandoned. These related applications are hereby incorporated herein by reference.

INT-CL: [06] B62 D 61/12

US-CL-ISSUED: 180/218; 180/6.5, 180/65.8, 180/907, 364/176, 701/124
US-CL-CURRENT: 180/218; 180/6.5, 180/65.8, 180/907, 700/71, 701/124

FIELD-OF-SEARCH: 180/7.1, 180/8.1, 180/8.2, 180/8.3, 180/8.6, 180/65.8, 180/907, 280/5.2, 280/5.28, 280/5.3, 280/5.32, 280/DIG.10, 901/1, 701/70, 701/22, 701/124

PRIOR-ART-DISCLOSED:

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Search Selected Search ALL Clear

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ART-UNIT: 361

PRIMARY-EXAMINER: Boehler; Anne Marie

ATTY-AGENT-FIRM: Bromberg & Sunstein LLP

ABSTRACT:

There is provided, in a preferred embodiment, a transportation vehicle for transporting an individual over ground having a surface that may be irregular. This embodiment has a support for supporting the subject. A ground-contacting module, movably attached to the support, serves to suspend the subject in the support over the surface. The orientation of the ground-contacting module defines fore-aft and lateral planes intersecting one another at a vertical. The support and the ground-contacting module are components of an assembly. A motorized drive, mounted to the assembly and coupled to the ground-contacting module, causes locomotion of the assembly and the subject therewith over the surface. Finally, the embodiment has a control loop, in which the motorized drive is included, for dynamically enhancing stability in the fore-aft plane by operation of the motorized drive in connection with the ground-contacting module. The ground contacting module may be realized as a pair of ground-contacting members, laterally disposed with respect to one another. The ground-contacting members may be wheels. Alternatively, each ground-contacting member may include a duster of wheels. In another embodiment, each ground-contacting member includes a pair of axially adjacent and rotatably mounted arcuate element pairs. Related methods are also provided.

51 Claims, 59 Drawing figures

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L29: Entry 1 of 4 File: USPT Oct 26, 1999

DOCUMENT-IDENTIFIER: US 5971091 A
** See image for Certificate of Correction **
TITLE: Transportation vehicles and methods

Application Filing Date (1):
19950203

Detailed Description Text (41):
FIGS. 25-26 provide detail of a three-wheel cluster design for the embodiment of FIGS. 18-20. Each cluster 251a and 251b has its own drive motor 252a and 252b, which drives the cluster through a gear train. The wheels of each cluster are powered separately by a motor 253a for cluster 251a and by a motor 253b for cluster 251b. The wheels within a given cluster 251a or 251b are driven synchronously by such cluster's motor 253a or 253b, as the case may be, through a radially disposed gear arrangement. A side view of the cluster 251a in FIG. 26 shows wheels 261a, 261b, and 261c with associated drive gears 262a, 262b, and 262c, driven by respective idler gears 263a, 263b, and 263c, which in turn are driven by power gear 264, which is turned by the shaft of motor 253a.

Detailed Description Text (67):
FIGS. 39A-B, 40A-B, 41A-B, and 42A-C illustrate the sequences in a control arrangement, to permit a vehicle according to the embodiment of FIGS. 11-21 to achieve stair climbing in accordance a second embodiment. Four basic sequences of operation are involved in this embodiment: start; reset angle origins; transfer weight; and climb. This embodiment, among others, may be conveniently implemented in the control arrangement of FIG. 27. Block diagrams showing control algorithms for achieving these four sequences are shown in FIGS. 43 (start), 44 (transfer weight), and 45 (climb). (No motion is involved in the reset angle origins sequence, so no control algorithm is shown for this sequence.) FIGS. 39A and 39B illustrate orientation of the cluster in the start sequence. In this sequence, the cluster moves from its normal balancing position on two wheels (FIG. 39A) to a position (shown in FIG. 39B) in which a first pair of wheels (one from each cluster) is on a first level and a second pair of wheels from each cluster is on the next stair. The angle values used in this description in connection with FIGS. 39A through 42C are those resulting from application of the nominal stair and cluster wheel sizes given in Table 1 above. In the start sequence, algorithm shown in FIG. 43, an input is provided of .theta..sub.C ref as a function of time to the cluster block 4301; the function varies smoothly from the start to the finishing values. Alternatively, an input of .theta..sub.PC ref can be provided in a similar fashion. Here the input of .theta..sub.C ref is run through processor 4302 to compute the quantity ##EQU4## This quantity, along with .theta..sub.C ref itself and .sigma. are provided as inputs to summer 4303, which computes ##EQU5## and provides this quantity as the .theta..sub.PC ref input to cluster block 4301. The cluster block 4301 is configured as in FIG. 34, except that .theta..sub.PC ref is no longer fixed at .pi., but varies as just described. The balancing block 4304 is configured as in FIG. 33, but the joystick gains K10 and K11 are set to 0. The summer 4305 provides compensation to the pitch reading of the inclinometer in the same manner as described above in connection with FIG. 35, and the output of summer 4305 is differentiated by differentiator 4306 to provide correction of .theta..sub.I in the manner described above in connection with FIG. 35, so

corrected pitch inputs .theta. and .theta. are provided to the wheel balancing algorithm 4304. The inputs r.theta..sub.wl and r.theta..sub.wr to balancing block are also derived in the same manner as described above in connection with FIG. 35.

Detailed Description Text (91):
At the pertinent instant above, the algorithm uses sensor A to determine the distance to the next step, the fact that it will take 2.pi./3 rotations of the cluster to get to the next step, and the wheel radius to calculate the climb ratio. If sensor A reads out-of-range (no riser, ready to step onto a landing), or a distance beyond a certain threshold (too far to riser, must go to balance mode first), it is noted that this is the last step; then the control goes to last step processing. This procedure is repeated for each successive step until the last step.

Detailed Description Text (109):
FIG. 52 shows the mechanical details of the hip and knee joints. Both joints are mechanically identical. The motor magnet rotor 5211, acted on by stator 5212, turns a shaft 5213, mounted in bearings 522 and 5272. The shaft 5213 rotates the wave generator 5271, which is an approximately elliptically shaped piece, rotating within bearing 5272. The wave generator 5271 causes the harmonic drive cup 5262 to incrementally engage and disengage its teeth with the harmonic drive spline 5261. This process causes the thigh 483 to move with respect to the calf 486 or seat frame 481 with a very high reduction ratio. An electromagnetic power off brake having electromagnet 5281 and brake pad 5282 can be applied to the wave generator 5271 to prevent the joint from rotating. This allows the motor to be turned off when the joint is not being actuated. A potentiometer 524 is geared through gear train 5241 to the harmonic drive cup 5262 to give absolute position feedback, while an encoder (not shown) is fixed to the motor shaft at position 523 to provide incremental position information.

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L29: Entry 2 of 4 File: USPT Aug 3, 1999

US-PAT-NO: 5931882
DOCUMENT-IDENTIFIER: US 5931882 A

TITLE: Combination grid recipe and depth control system

DATE-ISSUED: August 3, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
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Gildemaster; Kurt D.	Tea	SD		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
Raven Industries	Sioux Falls	SD			02

APPL-NO: 08/ 883423 [PALM]
DATE FILED: June 26, 1997

PARENT-CASE:
CROSS-REFERENCE TO PATENT APPLICATION The present application is a continuation-in-part of patent application Ser. No. 08/730,614, filed Oct. 21, 1996, which is a continuation-in-part of application Ser. No. 08/331,795, filed Oct. 31, 1994, now abandoned, which is a continuation-in-part of patent application Ser. No. 08/098,621 filed Jul. 29, 1993, now abandoned.

INT-CL: [06] G06 G 7/76, E02 F 3/76

US-CL-ISSUED: 701/50; 364/131, 364/138, 172/4, 172/4.5, 111/903, 239/1, 56/10.2E
US-CL-CURRENT: 701/50; 111/903, 172/4, 172/4.5, 239/1, 56/10.2E, 700/2, 700/9

FIELD-OF-SEARCH: 701/50, 56/1.2E, 56/DIG.15, 364/131, 364/138, 364/528.38, 364/167.03, 364/167.11, 702/159, 702/97, 702/2, 239/1, 239/61, 239/63, 239/73, 239/161, 239/164, 239/168, 111/130, 111/200, 111/903, 172/4, 172/4.5, 172/176, 172/724, 172/316, 172/421, 172/430, 50/1.2E, 50/DIG.15

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
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ART-UNIT: 361

PRIMARY-EXAMINER: Louis-Jacques; Jacques H.

ATTY-AGENT-FIRM: Hill & Simpson

ABSTRACT:

A multi-product applicating system, seed planting system and control are provided for the dispensing of liquid or granular products in pre-selected amounts and planting seeds at pre-selected depths and frequencies. Three or more separate products can be dispensed simultaneously and constant control and monitoring of all products is provided for at the control console. Seed planting depth can also be continuously monitored. The present invention further provides a grid recipe system for creating a recipe which defines the amounts of each type of product to be applied to specific areas of the field and/or which defines a seed planting depths and frequencies for specific areas of the field. The grid recipe system utilizes the GPS and a data card having the recipe and/or seed depth/frequency stored thereon for controlling a computer which communicates with the control console of the present invention. The recipe and/or depth/frequency grid is created by the farmer based on personal knowledge and experience.

18 Claims, 9 Drawing figures

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L29: Entry 2 of 4 File: USPT Aug 3, 1999

DOCUMENT-IDENTIFIER: US 5931882 A
TITLE: Combination grid recipe and depth control system

Application Filing Date (1):
19970626

Detailed Description Text (8):
Switch 66 is used in a first mode to enter in boom widths and in a second mode to enter the numeral 3. Thus, by utilizing switch 66 the width of each boom, in inches or centimeters can be input into the console memory for up to ten booms. Key 68 is used in a first mode to enter in wheel size for calculating speed when using a wheel drive speed sensor and in a second mode to enter the numeral 4. By using switch 68 the wheel drive speed sensor can be calibrated to provide appropriate speed input signals when utilizing such a wheel drive speed sensor. Such sensors are known and utilize hall effect switches, magnetic switches or other similar arrangements on a non-driven wheel such that the number of rotations are counted and, given the diameter of the wheel, distance and thus speed can be calculated and displayed.

Detailed Description Text (20):
The control system described above is shown on the right half of FIG. 4. The blocks shown include the multiple controlled metering systems. Five such systems are illustrated in FIG. 4. The controlled metering system may be mechanically, electrically or hydraulically driven. The planting depth control unit may be driven mechanically, electrically or hydraulically. As seen in FIGS. 4 and 9, the preferred planting depth control unit is controlled hydraulically. The rate of application is controlled by varying the speed or restricting the output of the delivery system. The volumetric output of the metering system is converted to a pulse train that can be recognized by the console. The controlled metering systems are connected to and communicate with the console.

L27: Entry 1 of 2 File: USPT Mar 2, 2004

US-PAT-NO: 6701228

DOCUMENT-IDENTIFIER: US 6701228 B2

TITLE: Method and system for compensating for wheel wear on a ~~train~~

DATE-ISSUED: March 2, 2004

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
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Shockley; James Francis	Orange Park	FL		
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ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
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APPL-NO: 10/ 157874 [PALM]

DATE FILED: May 31, 2002

INT-CL: [07] G06 F 7/00

US-CL-ISSUED: 701/19; 701/200, 73/179R, 246/1C, 246/122R

US-CL-CURRENT: ~~701/19; 246/1C, 246/122R, 701/200, 73/178R~~

FIELD-OF-SEARCH: 701/19, 701/20, 701/200, 701/213, 73/178R, 246/1C, 246/122R, 246/167R, 246/182R, 246/473R

PRIOR-ART-DISCLOSED:

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ART-UNIT: 3661

PRIMARY-EXAMINER: Cuchlinski, Jr.; William A

ASSISTANT-EXAMINER: Hernandez; Olga

ATTY-AGENT-FIRM: Piper Rudnick LLP Kelber; Steven B.

ABSTRACT:

A method and system for compensating for wheel wear uses position and/or speed information from an independent positioning system to measure some distance over which the train has traveled. Wheel rotation information is also collected over the distance. The wheel rotation information and distance and/or speed information are then used to determine the size of the train wheels. The method is performed periodically to correct for changes in wheel size over time due to wear so that the wheel rotation information can be used to determine train position and speed in the event of a positioning system failure.

60 Claims, 3 Drawing figures

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L29: Entry 3 of 4 File: USPT Aug 18, 1998

US-PAT-NO: 5794730
DOCUMENT-IDENTIFIER: US 5794730 A

TITLE: Indication system for vehicle

DATE-ISSUED: August 18, 1998

INVENTOR-INFORMATION:

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APPL-NO: 08/ 880574 [PALM]
DATE FILED: June 23, 1997

PARENT-CASE:
This is a continuation of application Ser. No. 08/474,313, filed Jun. 7, 1995, now abandoned which is a continuation of pending application Ser. No. 08/384,705, filed Feb. 3, 1995, which is a continuation of Ser. No. 08/250,693, filed May 27, 1994, now U.S. Pat. No. 5,701,965, which is a continuation-in-part of Ser. No. 08/021,789, filed Feb. 24, 1993, now abandoned.

INT-CL: [06] B62 D 61/12

US-CL-ISSUED: 180/7.1; 180/8.2, 180/65.1, 180/907, 340/441, 340/459, 340/407.1, 340/384.5, 364/176
US-CL-CURRENT: 180/7.1; 180/65.1, 180/8.2, 180/907, 340/384.5, 340/407.1, 340/441, 340/459, 700/71

FIELD-OF-SEARCH: 180/7.1, 180/8.2, 180/8.3, 180/8.5, 180/8.6, 180/65.1, 180/65.8, 180/907, 180/118, 180/6.48, 180/6.5, 180/6.54, 180/41, 180/21, 280/5.2, 280/5.26, 280/5.28, 280/5.31, 280/6.1, 280/205, 280/DIG.10, 340/441, 340/459, 340/407.1, 340/466, 340/460, 340/474, 340/432, 340/384.5, 318/611, 318/648, 318/649, 901/1, 395/80, 364/176, 364/463, 364/424.05, 364/424.06

PRIOR-ART-DISCLOSED:

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Search Selected Search ALL Clear

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL

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0980237	May 1951	FR	280/DIG.10
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ART-UNIT: 361

PRIMARY-EXAMINER: Boehler; Anne Marie

ATTY-AGENT-FIRM: Bromberg & Sunstein LLP

ABSTRACT:

There is provided, in a preferred embodiment, a transportation vehicle for transporting an individual over ground having a surface that may be irregular. This embodiment has a support for supporting the subject. A ground-contacting module, movably attached to the support, serves to suspend the subject in the support over the surface. The orientation of the ground-contacting module defines fore-aft and lateral planes intersecting one another at a vertical. The support and the ground-contacting module are components of an assembly. A motorized drive, mounted to the assembly and coupled to the ground-contacting module, causes locomotion of the assembly and the subject therewith over the surface. Finally, the embodiment has a control loop, in which the motorized drive is included, for dynamically enhancing stability in the fore-aft plane by operation of the motorized drive in connection with the ground-contacting module. The ground contacting module may be realized as a pair of ground-contacting members, laterally disposed with respect to one another. The ground-contacting members may be wheels. Alternatively, each ground-contacting member may include a cluster of wheels. In another embodiment, each

ground-contacting member includes a pair of axially adjacent and rotatably mounted arcuate element pairs. Related methods are also provided, including an indication system which modulates the pitch and repetition rate of an audible or tactile signal in accordance with speed and orientation of the vehicle.

11 Claims, 59 Drawing figures

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L29: Entry 4 of 4 File: USPT Aug 11, 1998

DOCUMENT-IDENTIFIER: US 5791425 A
TITLE: Control loop for transportation vehicles

Application Filing Date (1):
19950607

Detailed Description Text (41):
FIGS. 25-26 provide detail of a three-wheel cluster design for the embodiment of FIGS. 18-20. Each cluster 251a and 251b has its own drive motor 252a and 252b, which drives the cluster through a gear train. The wheels of each cluster are powered separately by a motor 253a for cluster 251a and by a motor 253b for cluster 251b. The wheels within a given cluster 251a or 251b are driven synchronously by such cluster's motor 253a or 253b, as the case may be, through a radially disposed gear arrangement. A side view of the cluster 251a in FIG. 26 shows wheels 261a, 261b, and 261c with associated drive gears 262a, 262b, and 262c, driven by respective idler gears 263a, 263b, and 263c, which in turn are driven by power gear 264, which is turned by the shaft of motor 253a.

Detailed Description Text (68):
FIGS. 39A-B, 40A-B, 41A-B, and 42A-C illustrate the sequences in a control arrangement, to permit a vehicle according to the embodiment of FIGS. 11-21 to achieve stair climbing in accordance a second embodiment. Four basic sequences of operation are involved in this embodiment: start; reset angle origins; transfer weight; and climb. This embodiment, among others, may be conveniently implemented in the control arrangement of FIG. 27. Block diagrams showing control algorithms for achieving these four sequences are shown in FIGS. 43 (start), 44 (transfer weight), and 45 (climb). (No motion is involved in the reset angle origins sequence, so no control algorithm is shown for this sequence.) FIGS. 39A and 39B illustrate orientation of the cluster in the start sequence. In this sequence, the cluster moves from its normal balancing position on two wheels (FIG. 39A) to a position (shown in FIG. 39B) in which a first pair of wheels (one from each cluster) is on a first level and a second pair of wheels from each cluster is on the next stair. The angle values used in this description in connection with FIGS. 39A through 42C are those resulting from application of the nominal stair and cluster wheel sizes given in Table 1 above. In the start sequence, algorithm shown in FIG. 43, an input is provided of .theta..sub.C ref as a function of time to the cluster block 4301; the function varies smoothly from the start to the finishing values. Alternatively, an input of .theta..sub.PC ref can be provided in a similar fashion. Here the input of .theta..sub.C ref is run through processor 4302 to compute the quantity ##EQU4## This quantity, along with .theta..sub.C ref itself and .pi. are provided as inputs to summer 4303, which computes ##EQU5## and provides this quantity as the .theta..sub.PC ref input to cluster block 4301. The cluster block 4301 is configured as in FIG. 34, except that .theta..sub.PC ref is no longer fixed at .pi., but varies as just described. The balancing block 4304 is configured as in FIG. 33, but the joystick gains K10 and K11 are set to 0. The summer 4305 provides compensation to the pitch reading of the inclinometer in the same manner as described above in connection with FIG. 35, and the output of summer 4305 is differentiated by differentiator 4306 to provide correction

of .theta..sub.I in the manner described above in connection with FIG. 35, so corrected pitch inputs .theta. and .theta. are provided to the wheel balancing algorithm 4304. The inputs r.theta..sub.wl and r.theta..sub.wr to balancing block are also derived in the same manner as described above in connection with FIG. 35.

Detailed Description Text (93):
At the pertinent instant above, the algorithm uses sensor A to determine the distance to the next step, the fact that it will take 2.pi./3 rotations of the cluster to get to the next step, and the wheel radius to calculate the climb ratio. If sensor A reads out-of-range (no riser, ready to step onto a landing), or a distance beyond a certain threshold (too far to riser, must go to balance mode first), it is noted that this is the last step; then the control goes to last step processing. This procedure is repeated for each successive step until the last step.

Detailed Description Text (112):
FIG. 52 shows the mechanical details of the hip and knee joints. Both joints are mechanically identical. The motor magnet rotor 5211, acted on by stator 5212, turns a shaft 5213, mounted in bearings 522 and 5272. The shaft 5213 rotates the wave generator 5271, which is an approximately elliptically shaped piece, rotating within bearing 5272. The wave generator 5271 causes the harmonic drive cup 5262 to incrementally engage and disengage its teeth with the harmonic drive spline 5261. This process causes the thigh 483 to move with respect to the calf 486 or seat frame 481 with a very high reduction ratio. An electromagnetic power off brake having electromagnet 5281 and brake pad 5282 can be applied to the wave generator 5271 to prevent the joint from rotating. This allows the motor to be turned off when the joint is not being actuated. A potentiometer 524 is geared through gear train 5241 to the harmonic drive cup 5262 to give absolute position feedback, while an encoder (not shown) is fixed to the motor shaft at position 523 to provide incremental position information.

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